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10/699,097	10/30/2003	Lotien Richard Huang	10434/60901	2657

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EXAMINER	
DAM, DUSTIN Q	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/699,097	HUANG ET AL.	
	Examiner	Art Unit	
	DUSTIN Q. DAM	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 June 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-42* is/are pending in the application.

4a) Of the above claim(s) *27-42* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Summary

1. This Office Action is in response to the Amendments and Remarks filed June 30, 2008.

2. In view of the Oath/Declaration and Amendments to the Specification, the objections to the Oath/Declaration and Specification previously presented in the Office Action sent April 14, 2008 have been withdrawn.

3. Claims 1-42 are currently pending with claims 27-42 withdrawn from consideration. Claims 1-26 have been fully considered.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-7, 9, 10, 13, 15, 16, 17, 19-22, and 24 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by WIKTOROWICZ et al. (U.S. Patent 6,214,191 B1).

a. With regards to claim 1, WIKTOROWICZ et al. discloses an integrated microfluidic device comprising a sample loading chamber (160, FIG. 3) and a fluid reservoir (140, FIG. 4) connected by a microfluidic channel (170, FIG. 3), wherein the microfluidic channel comprises an inlet and an outlet (FIG. 3 shows inlet of channel 170 at end towards 160 and outlet at end towards 140), the sample loading chamber is

configured to be structurally capable of loading a sample of charged molecules into the microfluidic device (via ports 130 or 135, see line 1-6, column 15 & line 32, column 16), is positioned at the inlet of the microfluidic channel (FIG. 3) and comprises a first electrode (135, FIG. 3 is port for electrode, see line 57-58, column 15) and a second electrode (132, FIG. 3 is port for electrode, see line 44-47, column 7 "132a") configured to be structurally capable of generating a first electric field in the sample loading chamber, wherein, when generated, the first electric field is configured to transfer charged molecules in the sample loading chamber to the inlet of the microfluidic channel, and the fluid reservoir is configured to be structurally capable of unloading a sample of charged molecules from the microfluidic device (via slot 140, FIG. 4), is positioned at the outlet of the microfluidic channel (FIG. 3) and comprises a third electrode (140, FIG. 4 is port for electrode, see line 57-58, column 15) configured to be structurally capable of generating a second electric field with at least the second electrode.

b. With regards to claim 2, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are nuclei acid molecules (line 9, column 2).

c. With regards to claim 3, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the nucleic acid molecules are deoxyribonucleic acids (line 17-26, column 12 “blood” inherently comprises DNA).

d. With regards to claim 4, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are proteins (line 10, column 2).

e. With regards to claim 5, WIKTOROWICZ et al. discloses an integrated microfluidic devices comprising a sample loading chamber (160, FIG. 3) and a fluid reservoir (140, FIG. 4) connected by a microfluidic channel (170, FIG. 3), wherein the microfluidic channel comprises an inlet and an outlet (FIG. 3 shows inlet of channel 170 at end towards 160 and outlet at end towards 140), the sample loading chamber is configured to be structurally capable of loading a sample of charged molecules into the microfluidic device(via ports 130 or 135, see line 1-6, column 15 & line 32, column 16), is positioned at the inlet of the microfluidic channel (FIG. 3) and comprises a first electrode (135, FIG. 3 is port for electrode, see line 57-58, column 15) and a second electrode (132, FIG. 3 is port for electrode, see line 44-47, column 7 "132a") configured to be structurally capable of generating a first electric field in the sample loading chamber, and a section of matrix material comprising charged molecules in the sample loading chamber (line 15-18, column 2 discloses conventionally separation takes place in a "cross linked matrix"), wherein, when generated, the first electric field is configured to electro-elute the charged molecules from the section of matrix material and to transfer the charged molecules to the inlet of the microfluidic channel, and the fluid reservoir is configured to be structurally capable of unloading a sample of charged molecules from the microfluidic device (via port 140, FIG. 40), is positioned at the outlet of the microfluidic channel (FIG. 3) and comprises a third electrode (140, FIG. 4 is port for electrode, see line 57-58, column 15) configured to be structurally capable of generating a second electric field with at least the second electrode.

f. With regards to claim 6, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are nucleic acid molecules (line 9, column 2).

g. With regards to claim 7, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the nucleic acid molecules are deoxyribonucleic acids (line 17-26, column 12 "blood" inherently comprises DNA).

h. With regards to claim 9, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are proteins (line 10, column 2).

i. With regards to claim 10, WIKITOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are polypeptide (line 8-12, column 2) sodium dodecyl sulfate supra molecules (line 29-34, column 2 "SDS").

j. With regards to claim 13, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the sample chamber comprises three electrodes (line 52-58, column 15).

k. With regards to claim 15, WIKTOROWICZ et al. discloses an integrated microfluidic device comprising a sample unloading chamber (160, FIG. 3) and a fluid reservoir (130, FIG. 4) connected by a microfluidic channel (180, FIG. 3), wherein the microfluidic channel comprises an inlet and an outlet (FIG. 3 shows inlet of channel 180 at end towards 130 and outlet at end towards 160), the sample unloading chamber is configured to be structurally capable of unloading a sample of charged molecules from the microfluidic device (via port 135, FIG. 4 & see line 55-57, column 7 "into and out"), is positioned at the outlet of the microfluidic channel (FIG. 3), and comprises a first

electrode (135, FIG. 3 is port for electrode, see line 57-58, column 15) and a second electrode (132, FIG. 3 is port for electrode, see line 44-47, column 7 "132a") configured to be structurally capable of generating a first electric field in the sample unloading chamber, wherein, when generated, the first electric field is configured to transfer charged molecules from the outlet of the microfluidic channel into the sample unloading chamber, and the fluid reservoir is positioned at the inlet of the microfluidic channel (FIG. 3) and comprises a third electrode (130, FIG. 3 is port for electrode, see line 38-44, column 7 "130a") configured to be structurally capable of generating a second electric field with at least the second electrode.

l. With regards to claim 16, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are nucleic acid molecules (line 9, column 2).

m. With regards to claim 17, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the nucleic acid molecules are deoxyribonucleic acids (line 17-26, column 12"blood" inherently comprises DNA).

n. With regards to claim 19, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are proteins (line 10, column 2).

o. With regards to claim 20, WIKTOROWICZ et al. discloses an integrated microfluidic device comprising a sample unloading chamber (160, FIG. 3) and a fluid reservoir (130, FIG. 4) connected by a microfluidic channel (180, FIG. 3), wherein the microfluidic channel comprises an inlet and an outlet (FIG. 3 shows inlet of channel 180 at end towards 130 and outlet at end towards 160), the sample unloading chamber is

configured to be structurally capable of unloading a sample of charged molecules from the microfluidic device (via port 135, FIG. 4 & see line 55-57, column 7 “into and out”), is positioned at the outlet of the microfluidic channel (FIG. 3), and comprises a first electrode (135, FIG. 3 is port for electrode, see line 57-58, column 15) and a second electrode (132, FIG. 3 is port for electrode, see line 44-47, column 7 “132a”) configured to be structurally capable of generating a first electric field in the sample unloading chamber, and a section of matrix material in the sample unloading chamber (line 15-18, column 2 discloses conventionally separation takes place in a “cross linked matrix”), wherein, when generated, the first electric field is configured to transfer charged molecules from the outlet of the microfluidic channel into the sample unloading chamber, and the fluid reservoir is positioned at the inlet of the microfluidic channel (FIG. 3) and comprises a third electrode (130, FIG. 3 is port for electrode, see line 38-44, column 7 "130a") configured to be structurally capable of generating a second electric field with at least the second electrode.

p. With regards to claim 21, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are nucleic acid molecules (line 9, column 2).

q. With regards to claim 22, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the nucleic acid molecules are deoxyribonucleic acids (line 17-26, column 12“blood” inherently comprises DNA).

r. With regards to claim 24, WIKTOROWICZ et al. discloses an integrated microfluidic device wherein the charged molecules are proteins (line 10, column 2).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 8, 14, 18, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over WIKTOROWICZ et al. (U.S. Patent 6,214,191 B1) in view of ADCOCK (U.S. Patent 4,959,133).

a. With regards to claim 8, dependent claim 7 is clearly anticipated by WIKTOROWICZ et al. under 35 U.S.C. 102(b) as discussed above.

WIKTOROWICZ et al. does not appear to explicitly disclose an integrated microfluidic device wherein the DNA is greater than about 50 kilobases in size.

However, ADCOCK discloses a method of filed inversion electric pulses to force DNA or protein out of a gel and into an appropriate receiver (ABSTRACT). The inverted

pulsed electric field allows for the electro-elution of higher molecular weights (line 57-60, column 2 such as "larger in molecular weight than 2 x 10^4 base pairs").

Thus, at the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify the integrated microfluidic device, as disclosed by WIKTOROWICZ et al., to include applying an inverted pulsed electric field, as disclosed by ADCOCK, because the inverted pulsed electric field allows for the electro-elution of higher molecular weights.

b. With regards to claim 14, independent claim 5 is clearly anticipated by WIKTOROWICZ et al. under 35 U.S.C. 102(b) as discussed above. WIKTOROWICZ et al. discloses an integrated microfluidic device comprising a plurality of electrodes.

WIKTOROWICZ et al. does not appear to explicitly disclose an integrated microfluidic device wherein the two electrodes generate repeatedly inverted electric pulses.

However, ADCOCK discloses a method of filed inversion electric pulses to force DNA or protein out of a gel and into an appropriate receiver (ABSTRACT). The inverted pulsed electric field allows for the electro-elution of higher molecular weights (line 57-60, column 2 such as "larger in molecular weight than 2 x 10^4 base pairs").

Thus, at the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify the integrated microfluidic device, as disclosed by WIKTOROWICZ et al., to include applying an inverted pulsed electric field, as disclosed by ADCOCK, because the inverted pulsed electric field allows for the electro-elution of higher molecular weights.

c. With regards to claim 18, dependent claim 17 is clearly anticipated by WIKTOROWICZ et al. under 35 U.S.C. 102(b) as discussed above. WIKTOROWICZ et al. discloses an integrated microfluidic device comprising a plurality of electrodes.

WIKTOROWICZ et al. does not appear to explicitly disclose an integrated microfluidic device wherein the DNA is greater than about 50 kilobases in size.

However, ADCOCK discloses a method of filed inversion electric pulses to force DNA or protein out of a gel and into an appropriate receiver (ABSTRACT). The inverted pulsed electric field allows for the electro-elution of higher molecular weights (line 57-60, column 2 such as "larger in molecular weight than 2×10^4 base pairs").

Thus, at the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify the integrated microfluidic device, as disclosed by WIKTOROWICZ et al., to include applying an inverted pulsed electric field, as disclosed by ADCOCK, because the inverted pulsed electric field allows for the electro-elution of higher molecular weights.

d. With regards to claim 23, dependent claim 22 is clearly anticipated by WIKTOROWICZ et al. under 35 U.S.C. 102(b) as discussed above. WIKTOROWICZ et al. discloses an integrated microfluidic device comprising a plurality of electrodes.

WIKTOROWICZ et al. does not appear to explicitly disclose an integrated microfluidic device wherein the DNA is greater than about 50 kilobases in size.

However, ADCOCK discloses a method of filed inversion electric pulses to force DNA or protein out of a gel and into an appropriate receiver (ABSTRACT). The inverted

pulsed electric field allows for the electro-elution of higher molecular weights (line 57-60, column 2 such as "larger in molecular weight than 2 x 10^4 base pairs").

Thus, at the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify the integrated microfluidic device, as disclosed by WIKTOROWICZ et al., to include applying an inverted pulsed electric field, as disclosed by ADCOCK, because the inverted pulsed electric field allows for the electro-elution of higher molecular weights.

9. Claims 11, 12, 25, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over WIKTOROWICZ et al. (U.S. Patent 6,214,191 B1) in view of GAUTSCH (U.S. Patent 6,162,602).

a. With regards to claim 11 and 12, independent claim 5 is clearly anticipated by WIKTOROWICZ et al. under 35 U.S.C. 102(b) as discussed above. WIKTOROWICZ et al. discloses an integrated microfluidic device comprising a section of matrix material.

WIKTOROWICZ does not appear to explicitly disclose an integrated microfluidic device wherein the section of matrix material is an agarose gel plug.

However, GAUTSCH discloses a method for nucleic acid base sequencing and discloses separating fragments by means of capillary electrophoresis employing agarose or polyacrylamide gel (line 10-17, column 3).

Thus, at the time of the invention, it would have been obvious to a person having ordinary skill in the art to substitute the section of matrix material in the integrated microfluidic device, as disclosed by WIKTOROWICZ et al., with an agarose gel plug, as disclosed by GAUTSCH, because the agarose gel is an improved method over slab gel

and agarose is a functional equivalent to the polyacrylamide (GAUTSCH: line 10-17, column 3) and one with ordinary skill would have a reasonable expectation of success since both WIKTOROWICZ et al. and GAUTSCH are concerned with separating fragments.

b. With regards to claim 25 and 26, independent claim 20 is clearly anticipated by WIKTOROWICZ et al. under 35 U.S.C. 102(b) as discussed above. WIKTOROWICZ et al. discloses an integrated microfluidic device comprising a section of matrix material.

WIKTOROWICZ does not appear to explicitly disclose an integrated microfluidic device wherein the section of matrix material is an agarose gel plug.

However, GAUTSCH discloses a method for nucleic acid base sequencing and discloses separating fragments by means of capillary electrophoresis employing agarose or polyacrylamide gel (line 10-17, column 3).

Thus, at the time of the invention, it would have been obvious to a person having ordinary skill in the art to substitute the section of matrix material in the integrated microfluidic device, as disclosed by WIKTOROWICZ et al., with an agarose gel plug, as disclosed by GAUTSCH, because the agarose gel is an improved method over slab gel and agarose is a functional equivalent to the polyacrylamide (GAUTSCH: line 10-17, column 3) and one with ordinary skill would have a reasonable expectation of success since both WIKTOROWICZ et al. and GAUTSCH are concerned with separating fragments.

Response to Arguments

10. Applicant's arguments filed June 30, 2008 have been fully considered but they are not persuasive.

a. Applicant argues starting on page 11 of the response filed June 30, 2008 that WIKTOROWICZ et al. fails to meet the limitations of claims 1, 5, 15, and 20 because the disclosure only shows port 130 as a loading port and ports 136 and 138 as unloading ports. However, this argument is not persuasive since WIKTOROWICZ et al. discloses multiple ports that are configured to be able to load and unload samples, for example port 135, FIG. 4 and line 55-57, column 7 discloses port 135 is capable of loading and unloading media and fluids.

b. Applicant argues starting on page 13 of the response filed June 30, 2008 that WIKTOROWICZ et al. does not disclose a sample loading and sample unloading chamber because chamber 160 is not configured to load or unload samples. However, this argument is not persuasive because sample chamber 160 is configured to be able to load and unload samples via port 135, FIG. 4 and line 55-57, column 7 discloses port 135 is capable of loading and unloading media and fluids. The interpretation of sample loading and sample unloading chambers of WIKTOROWICZ et al. is maintained and presented in the rejections above.

c. Applicant argues starting on page 14 of the response filed June 30, 2008 that WIKTOROWICZ et al. does not disclose the claimed first and second electrodes configured to generate electric fields. However, this is not persuasive since WIKTOROWICZ et al. discloses multiple electrodes in the various ports which are all

inherently connected to a power supply which the electrodes are configured to be structurally capable of generating the claimed electric fields.

d. Applicant argues starting on page 15 that WIKTOROWICZ et al. does not disclose a cross-linked matrix because the teaching of the cross-linked matrix is in the prior art description and because WIKTOROWICZ et al. discloses it is not required to use cross-linked matrix in the present invention. Applicant further argues that since WIKTOROWICZ et al. does not disclose a cross-linked matrix, ADCOCK and GAUTSCH are not combinable. However, these arguments are not persuasive since WIKTOROWICZ et al. discloses sample loading/unloading chamber 160 can load and unload media or fluids via port 135 (line 55-57, column 7) and does not definitively limit the media/fluids used during separation. WIKTOROWICZ et al. discloses it is known to use cross-linked matrix as a separation media (column 2), which would be load/unloaded via port 135 into chamber 160.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DUSTIN Q. DAM whose telephone number is (571)270-5120. The examiner can normally be reached on Monday through Thursday, 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571)272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/
Supervisory Patent Examiner, Art Unit 1753

dd
October 23, 2008